TROPICAL AGRICULTURE

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TROPICAL AGRICULTURE is published at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies, at the end of the third week of the month preceding the one of issue. Advertisement rates can be obtained at the College from the Editor, or from the Secretary of the College, 14, Trinity Square, London, E.C. 3, England. The Editor will be glad to consider authoritative articles for publication. It is understood that opinions expressed in signed articles are those of the author and do not necessarily represent the policy or opinion of the College Authorities. Increasing numbers of inquiries are being received from various parts of the tropics which can be answered only by persons possessed of an intimate knowledge of local conditions. Enquirers should first satisfy themselves that their local Department of Agriculture is not able to supply them with the desired information before communicating with us. Correspondence which will be replied to is invited on all other matters pertaining to tropical agriculture, science and development.

THE WEST INDIES.

Imperial Department of Agriculture.

REFERENCE is made on another page of this issue to the appointment of the Commissioner for Agriculture. This appointment by the Governing Body of the College in consultation with the Colonial Office is the result of a recommendation to that effect made conjointly by the Advisory Committee and the Academic Board with a view to strengthening the bonds between the College and those islands in the West Indies that have been served in the past by the Imperial Department of Agriculture. The Commissioner will form a *liaison* between the local departments and the College and will advise them in scientific matters and co-ordinate their policies.

The Imperial Department of Agriculture has played an important part in the affairs of the West Indies for more than a quarter of a century. At the time of its inception in the closing years of the last century, the British West Indian Islands were in a state of acute depression, several of them with a depleted treasury and a revenue less than their irreducible expenditures and as a result of this condition the Imperial Government was often called upon to make grants-in-aid to pay off the deficits.

So serious was this state of affairs that a Royal Commission was appointed which, after taking evidence in England, visited the West Indies in 1897. The result was that the Imperial Department of Agriculture was established for a period of ten years in the first place, and was to be supported by Imperial funds. This Department was to endeavour to find means to improve the sugar and other existing industries and to try to introduce other crops for cultivation in the hopes of restoring a degree of prosperity to the planters and peasants in these Islands.

The life of the Department has been extended from time to time and from the start up to 1922 it retained its headquarters office in Barbados. When the College was founded the Department was amalgamated with it and the Departmental Staff became the College staff, and the Imperial Commissioner of Agriculture became the Principal of the College.

As to the support of the Department, the whole period of the nearly twenty-nine years may be divided into three sections. In the first of these, the Imperial Government provided an annual vote which averaged nearly £17,500 per annum for ten years. This was the time when the depression was greatest, when revenue fell short of expenditure

and when a beginning was made in the improvement of agricultural conditions. These large sums of money were used to provide for the maintenance of the Imperial Department at its headquarters, the travelling expenses of its officers and the cost of its publications, which very shortly began to be issued, and they also were the source from which the very considerable grants-in-aid were made to the several Island Governments for experiments and for the development of local departments. The larger colonies Trinidad, British Guiana and Jamaica, which were in a better position to support their agricultural work and employ scientific officers on their departmental staffs, received smaller grants and for a shorter period, the allocations to these colonies ceasing in 1906. In other colonies, they were continued longer, but, after several years on a gradually diminishing scale, these grants finally ceased about 1913.

During the second of these periods, the Imperial grants were made for the purpose of supporting the Imperial Department's headquarters staff, meeting the cost of publications and covering the cost of travelling.

In the third of these periods the situation was somewhat different. The Department had become a part of the College. The Imperial Government contributed to the College, and the Island Governments also contributed to the College and from these funds the College was to maintain the work of the Department. But whereas in the past the Department had paid the travelling expenses of its officers on all official visits, under the latest arrangements the travelling expenses under certain circumstances were to be paid by the Colony receiving the service. From this it will be seen that from the founding of the Department, in 1898, to the formation of the College in 1922, the Imperial Department was entirely supported by Imperial Funds, while in the past five years the Imperial Government and the Island Governments have contributed to the College funds which were to cover the work of the Department.

The Imperial funds contributed for the work of the Imperial Department of Agriculture amounted to more than £250,000 in the period of twenty-three and a half years from October 1898 to March 1922. Of this, about £6,000 per annum or about one half the total cost was used for the expenses of the head office, while the other half was spent in grants to the several Island Governments.

For the first ten years of the existence of the Department, Sir Daniel Morris was the Commissioner and on his retirement Sir Francis Watts held the position until his retirement in 1924, when Dr. H. M. Leake succeeded to the double appointment of Principal and Imperial Commissioner.

The Imperial Department appears to have been so-called because it was a department set up by and entirely supported by funds provided by the Imperial Government, and further the name served to distinguish it from the departments which had existed in the several West Indian Colonies and those which subsequently grew up in others.

That it has deserved its Imperial name on other grounds is proved by the influence it has exerted in other parts of the Empire. It has been a pattern on which similar organisations throughout the British tropics have been built, and many of the scientific officers who obtained their early tropical training while attached to this department in the West Indies have played very prominent parts in agricultural development in those colonies to which they have been transferred.

The publications of this Department, *The West Indian Bulletin*, *The Agricultural News* and *Pamphlet Series* have communicated agricultural information to all parts of the Empire, and they might well be considered as Imperial publications.

The results of the work of the Department have had a very general application abroad as well as in the West Indies. The development of seedling canes has affected the sugar industry in all parts of the world where sugar-cane has been grown as a crop. It is true that sugar-cane seedlings had been grown and were being cultivated on estates before the formation of the Department but this work was greatly increased under the stimulus given it by the Department.

Previous to 1904, cotton had been tried in the Botanic Gardens and on estates in certain Islands. In 1903 a supply of the best seed was obtained from the Sea Islands and, in 1904, some 7,600 acres were planted with this crop. The success of the industry in the West Indies has stimulated cotton cultivation in other parts of the Empire and the development of community action including the fixing of the date of planting and the enforcing of a close season have been of value in the development of the cotton industry in other places.

In the case of other crops such as cacao, limes, coconuts and many of the minor crops, including ground provisions and other foods, the local departments of agriculture have encouraged the extension of these cultivations and their introduction into new areas and have been able to give valuable advice in regard to them based on observations and experiments.

One of the first efforts of the newly formed department was to organise an Agricultural Conference, which was held in January 1899. The success and value of this conference was so great that others were held and the reports of these meetings have been published in *The West Indian Bulletin*. Not only were the papers which were read and the discussions which followed of great value but the personal contact of planters and officials from the several colonies led to a degree of co-operation and mutual understanding which would have been difficult to get in any other way. Nine such conferences were held and the records of these contained very valuable information with regard to progress of agriculture in the West Indies.

The publications of the Department and the Agricultural Conferences have had a very distinctive educational value. The Department's interest in education, however, went much further than that. Agricultural scholarships were

established and agricultural science masters appointed at several of the secondary schools and in some of the Islands agricultural schools were established, all of which have served very useful purposes. The holding of agricultural shows and exhibitions was supported and very greatly stimulated by the Department and for several years the West Indian Islands were represented as regular exhibitors in the Canadian National Exhibitions at Toronto.

In its scientific work the Imperial Department always maintained a high standard, and important results have attended the efforts of the officers on its staff. Many well-known insect pests have been studied, life histories worked out and recommendations made or control. Insects new to science which have appeared as pests of crops have been studied. The fungoid pests also have been investigated, life histories worked out and means of control suggested, and relationships between the attack of insects and the incidence of diseases have been established. Studies of soil conditions and ecological problems have also yielded important results.

An interesting and valuable line of work has been the introduction of plants which were likely to be of interest as possible major or minor crops.

Much has been done also to improve the condition of livestock in the Islands by the importation of animals of improved strains and breed which have been distributed throughout the Islands.

Of great value to the West Indies has been the co-operation which the Department has been able to maintain with various departments and organisations in the United Kingdom, in the Dominions and Colonies, and in other countries. Throughout its life the Department has worked in friendly co-operation with the Royal Botanic Gardens at Kew, in all things that have had to do with botanical studies and the importation of desirable plants. The British Cotton Growing Association rendered valuable help in establishing the cotton industry by loans of money and of machinery. Contact has been maintained with agricultural workers in all parts of the Empire and the Department maintained cordial relations with the scientific officers of the United States Department of Agriculture from all of whom much valuable help has been derived.

The exchange list which the Department was able to maintain through the distribution of its publications made the latest agricultural information in all parts of the world easily available to the West Indian and other readers of *The Agricultural News*. The results of research and investigation of agricultural problems in the West Indies published in *The West Indian Bulletin* and in *The Pamphlet Series* were made freely available to workers in other parts of the world and their results were in consequence freely communicated to the Department.

The contributions by the Imperial Government for the maintenance of its Department of Agriculture in the West Indies have amounted to a very large sum of money. These contributions commenced at a time when the West Indian Islands were suffering from a very serious financial depression. Sugar-cane was the principal industry and in many of the Islands the only one which provided an export commodity. The bounty fed beet sugar of the Continent had flooded the markets of the United Kingdom with a sugar that could be sold below the cost of production in the West Indies. The Bourbon cane which had been the principal variety cultivated in most of these Islands had suffered so extensively from attacks of disease that this cultivation had to be abandoned. Hurricanes and volcanic eruptions, in the case of certain of the Islands, had worked such havoc as to increase the despondency of their inhabitants. In all the smaller Islands the methods of sugar manufactured were such that a very large proportion of the sugar in the cane was lost after the cane was reaped.

The Department of Agriculture by stabilising and stimulating the production of sugar-cane seedlings, gave new hope to the cultivators of this crop, and from time to time new seedlings have been developed with qualities far superior to those formerly grown. The improvement in the amount and quality of the juice of the cane together with the development of better agricultural methods resulting in higher yields of cane per acre and the development of central factories in which a great saving was made in recovery of the sugar from the juice have all worked together to make possible the continued existence of the sugar-cane industry in the West Indies.

The introduction of Sea Island cotton and the building up of an industry which has proved of fundamental value, has saved several of the Islands from sheer bankruptcy.

In the case of several of the smaller Islands previous to the establishment of the department the expenditure year after year continued to exceed the revenue, with the result that the Imperial Government had found it necessary to make grants of money to cover these deficits. Within the first ten years of the existence of the Department, these deficits had ceased to occur and the Islands were all in possession of a reserve fund. It has been stated in connection with the sugar-cane work that the value of new cane seedlings to the sugar industry has been greater than the total cost of the Department. In addition to this, the value of the other lines of work and investigation must be reckoned as almost of incalculable value, and with reference to the Imperial College of Tropical Agriculture it may fairly be said that the Department was responsible for its inception. Sir Francis Watts, as Commissioner, for years held strong views with regard to the establishment of an agricultural college in the West Indies, and it was his clear presentation of the general principles on which such a college might be founded which led to recognition in the United Kingdom and the appointment of a Committee so ably headed by Lord Milner, which resulted, eventually in the building up of this institution.

DR. C. L. WITHYCOMBE.

The following Obituary Notice of Dr. C. L. Withycombe, who was Lecturer in Entomology at the Imperial College of Tropical Agriculture from 1923-26, is reprinted from "Nature" Vol. 119, p. 131. A portrait of Dr. Withycombe will be found on the opposite page.

DR. CYRIL LUCKES WITHYCOMBE, lecturer in advanced and applied entomology, died at Cambridge on 5th December, aged twenty-eight years. Born at Walthamstow, the son of a schoolmaster, he early developed a peculiar taste and power for the keeping and rearing of insects, and this indicated his career. He passed his Intermediate Science Examination from Birkbeck College, and then went on to King's College, where he came under the influence of the late Professor Dendy and of Dr. Mackinnon, on whose advice, with the object of broadening his science he took the ordinary degree in botany, chemistry, and zoology instead of honours in one subject. He then went to the Imperial College to work under the late Professor Lefroy, who regarded him as by far the best pupil he ever had.

During these years Withycombe spent all his spare time in the field, and he kept and reared a large series of Neuroptera, on which group he published fourteen papers, the most important being on the biology of the group in reference to the phylogenetic significance of their immature stages (*Trans. Ent. Soc.*, 1923 and 1925). The phylogeny had already been discussed by Handlirsch on palaeontological evidence, and by Tillyard and Comstock on external morphology and wing venation. While their work was fully considered, the result was a modestly written discussion of the relationships of the families together, summarised by the propounding of a new phylogenetic tree, based also on the mass of new facts discovered by the author; assuredly this paper marks a stage in the scientific history of the group. It is a pity that the task he had set himself of monographing the British species cannot be carried out.

In 1923 Dr. Withycombe went to Trinidad as lecturer in entomology at the newly founded Imperial College of Tropical Agriculture. He was happy in having agreeable colleagues, and in seeing the tropics and their produce. He described to me how his first year almost daunted him with his realisation of the insufficiency of present knowledge. It was clear he was passing through his transition period, blending what he knew of three sciences into one harmonious whole. It was at this time he published his work on the bladders of Utricularia, which as a boy he had independently discovered as capturing their prey by active movement in response to stimuli. His thought henceforth was of his plant first, and this is well seen in his research on the sugar-cane froghopper blight in Trinidad. Here he was dealing with a pest not introduced but belonging to the forests of the Island, only secondarily attacking the canes. Having studied his insects and his plant together as one entity, his advice to the planter is to attend with the greatest care to his cultivation, in particular to see that his canes have plenty of water physiologically available for their growth. "Canes do not necessarily show serious blight when froghoppers have been abundant, nor is an abundance of the insect a necessary condition for serious blight." Other research in Trinidad resulted in the discovery of a bollworm, *Sacadodes pyralis*, a moth, the life history of which was worked out, and much time was spent in studying and rearing successive generations of cotton stainers, Dysdercus, bugs which prefer cotton to their natural Malvaceous plants and stain and rot the cotton lint by the bacteria and fungoid spores they introduce.

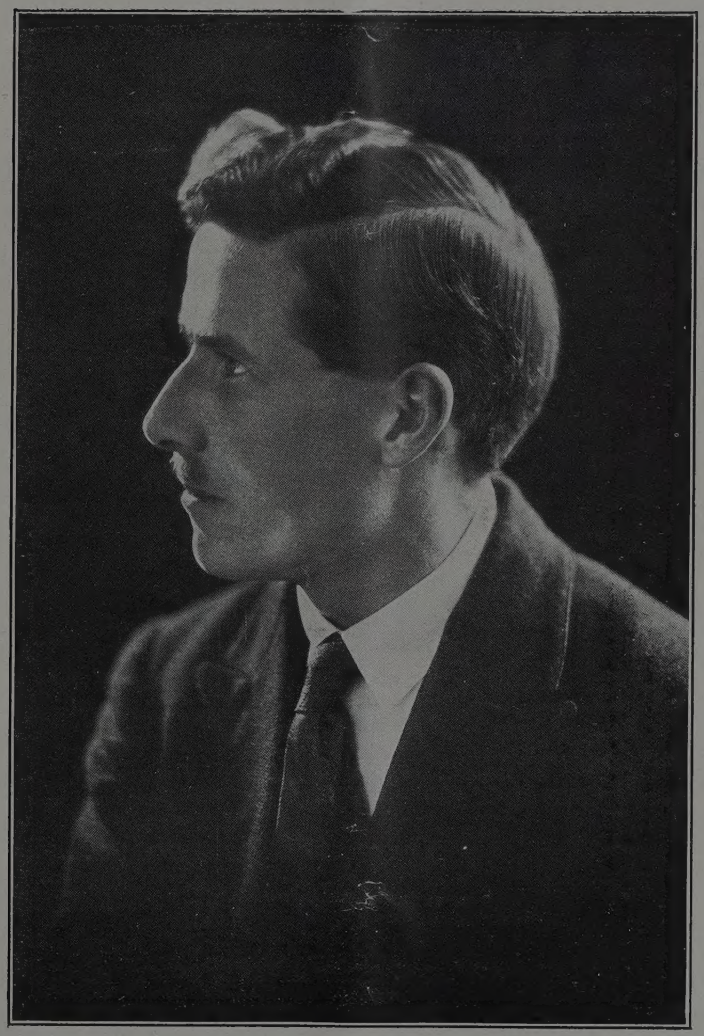
Dr. Withycombe only came to Cambridge in August last, and he at once set to work on his material of froghoppers and Dysdercus. He had to prepare a course of advanced lectures, and he had a sub-department to get into order. As a lecturer he was almost conversational, as he had seen everything of which he spoke, and his class loved him. As a colleague we admired and loved him too, for he had a most lovable personality, quite extraordinary vision, and absolute devotion to research.

J. S. G.

COMMISSIONER OF AGRICULTURE.

AT a meeting of the Governing Body in London on 11th March, 1927, Professor H. A. Ballou was appointed Commissioner of Agriculture for the West Indies. Since the Imperial Department of Agriculture was amalgamated with the College the Principal has been also Commissioner of Agriculture. It has been found impossible for the Principal to give all the time and attention to matters which are the function of the Department of Agriculture, and to make the visits to the several Islands which are necessary to maintain a proper contact of the College with the Islands.

Advantage was taken of the visit of Sir Arthur Shipley to Trinidad to discuss the means by which the interest of the Islands could best be served and at a joint meeting of the Advisory Committee of the Governing Body and the Academic Board of the College it was recommended that a Commissioner be appointed who should do the necessary travelling and advise the local Governments and the local Departments of Agriculture and co-ordinate the scientific and agricultural work and generally endeavour to maintain a closer liaison between them and the College. This recommendation was acted upon by the Governing Body in consultation with the Colonial Office, and the post was offered to and accepted by Professor Ballou in conjunction with his present post as Professor of Entomology and Head of the Section of Entomology and Zoology in the College. Professor Ballou has assumed the duties of his new office as from 1st April, and will shortly visit the Windward and Leeward Islands.



The Late Dr. C. L. Withycombe.

ANTI-MALARIAL MEASURES.

OF the various enterprises usefully carried on under the auspices of the Rockefeller Foundation, none excels in practical value the work of the International Health Board in the study and control of malaria. In Palestine during 1924, as narrated in the annual report of the Foundation for that year, surveys were made which show that while the mosquito *Anopheles bifurcatus*, breeding in wells and cisterns, is the carrier of malaria in towns, the principal vector in rural areas is *Anopheles elutus*. In the towns much benefit has been derived from oiling the wells and cisterns: in the country districts hopes are fixed on prospective legislation requiring the tenants of land to check the breeding of mosquitoes. Palestine, it is suggested, at the present time needs management of its water supplies rather than general drainage. Other regions, on the other hand, have been greatly the better for the drainage of superfluous water. In the malarious parts of Porto Rico, for example, the disease is worst near cane fields where drainage is neglected: Fajardo, where drainage is efficient, appears to be free of infection Promising results have been got in Brazil by anti-larval measures alone without quininization of the inhabitants, and in Nicaragua an important gold-mine, which had been closed for some years owing to the high malaria rate among its labourers, has, after drainage, been reopened. Officers of the International Board, in response to an invitation received from the Government of Italy, made a general survey of the malaria position of that country. Control, especially in the South of Italy, has hitherto been largely confined to the free distribution of quinine, but now the Government provides in addition screened houses for its own employees, and offers premiums to private employers who follow its example. In order to throw light on the malarial problems of the southern United States, a special investigation has been made at Leesburg in Georgia. Of the three indigenous Georgian anophelines, it has been ascertained that *Anopheles quadrimaculatus* is for practical purposes the sole vector of malaria. It frequents level lands and impounded water. The imago when at rest does not assume the traditional anopheline posture, with its body elevated at an angle of 45 degrees: it adopts, on the contrary, a flat or culicine attitude. Its range of flight was observed to be small; few specimens travelled a mile from their breeding place. The larvae of Georgian mosquitoes during the winter months, when the temperature of the water ranges from 39° to 50° spend most of their time at the bottom of pools. The habits of one mosquito may protect it from assaults which are lethal to allied species. Thus a Georgian larva at the bottom of the water is beyond the usual range of surface oiling. Without patient research there can be no clear understanding of the several problems and no sure guidance as to appropriate action. The report of the Rockefeller Foundation is at once a stimulus and a caution to all engaged in anti-malarial campaigns.—*British Medical Journal.*

BANANA RESEARCH.

THE importance of the banana as an economic product has long been recognized particularly in connection with the West Indian trade. The Imperial College of Tropical Agriculture has been engaged during the last three years in research with this crop more particularly in regard to the situation that has arisen owing to the rapid spread of Panama disease. This disease attacks the Gros Michel in particular—a variety which has up to the present being considered commercially the most suitable type, on account mainly of its large size, and good carrying capacity.

The research workers at the College have been seriously hampered in the scope of their investigations by lack of funds and the necessary facilities. Good progress has been made in the direction of breeding and testing of immune varieties, but there has been difficulty in estimating the carrying capacity, and therefore the commercial possibilities of some of these immune types. It is gratifying to be able to announce therefore that there is now every prospect of a substantial grant being allotted to the College, which will enable the work on this crop to be further expanded.

It will be remembered that the Imperial Economic Committee in their Third Report on Fruit discussed at length the question of the banana trade, and that a definite scheme for developing banana research was put up by Dr. A. W. Hill, the Director of the Botanic Gardens at Kew.

Information has now been received that the Research Committee acting on Dr. Hill's scheme has agreed to recommend that the following grants should be made available from the Empire Marketing Fund:—

(1) A maintenance grant not exceeding £2,000 per annum for a period of five years subject to funds being made available by Parliament for salaries and allowances for two scientific officers, laboratory, cold storage, and travelling expenses.

(2) A capital grant not exceeding £350 for a quarantine station at Kew.

(3) A capital grant for a cold storage chamber be approved in principle, and that pending investigations into the probable cost a sum not exceeding £2,000, should be provisionally allotted for the purpose.

G. E.

ADVERTISEMENTS.

MR. HENRY H. R. MOLE, of Little Neck, Long Island, New York, has been appointed advertising agent for *Tropical Agriculture* in the United States of America and Canada. All communications from those countries respecting advertisements should be addressed to him. The address of our advertising agent in the United Kingdom is 14, Trinity Square, London, E.C.3. Firms in the West Indies and British Guiana are requested to address their communications to the Editor, *Tropical Agriculture*, Imperial College of Tropical Agriculture, Trinidad.

WEST AFRICA.

(*Concluded.*)

Education.

In Africa one deals "with two very different classes of people, the English Speaking African of the coast towns and the vernacular-speaking people of the tribes inland. The former have long been in contact with European influences and have been taught our ways and speech . . . the tribes in the interior . . . have, on the other hand, only recently come into contact with our civilisation. It is evident that . . . any formulation of education policy requires the most careful adaptation." For conscious direction according to deliberated principles it is recognised that "definite control over all education must be given to the Government so that in missionary and private schools, as well as in Government provided schools a real advance in the quality of education may be effected." The language question naturally arises and "in places where the children at home and in their native surroundings speak their own native language, there can be no question that elementary instruction must start in the vernacular . . . Where the African in his home hears and speaks English, every effort should be made to . . . eliminate the barbarous 'pidgin' which often takes its place. A fair number of books exist in the various native vernaculars and they appear to be well adapted to local experience and environment. On the other hand, the majority of English textbooks in use along the coast are in my opinion unsuitable. The whole question of school literature seems to require immediate attention . . . Some of the books which I observed being used in West African schools have long been obsolete in England . . . I was much struck by the degree to which many of the books, especially in the junior classes, deal with words and objects entirely outside the experience of the African child. In one school that I visited a boy was reading a chapter from an elementary reader entitled 'The Starling the Farmer's Friend.' The chapter dealt with scenes of farming life and experience in England and can have conveyed nothing but meaningless sounds to a child living in totally different surroundings amid an entirely different fauna and flora . . . The next essential weakness of the present educational system in West Africa on the technical side is the excessive cult of the certificate . . . I am not satisfied that either the Cambridge Locals or the Durham Pass Degree, which can be obtained at Fourah Bay College in Sierra Leone, represent standards with which we can be satisfied either now or in the future . . . There is another point in connection with these examination tests which is worthy of consideration. Hygiene and sanitation are so important in the Tropics that both Government and missions have rightly endeavoured to introduce the teaching of elementary hygiene and sanitation in the schools. Unfortunately this is a subject for which there are no marks in any examination test and consequently both teachers and pupils tend to underrate the significance of the subject. Another point which is very noticeable throughout West Africa is the comparatively small provision which has been made for the education of girls . . . no society can really advance if there is a great disparity between the number of educated men and women."

Practical wisdom is shewn in the remark that educational "changes must necessarily be slow, and although the need is great it would be most undesirable to act precipitately."

Palm Oil.

As palm products, *i.e.*: palm oil and palm kernels are the chief present exports of Nigeria and Sierra Leone—and a fall in the price of cocoa would cause the Gold Coast to turn its attentions to the exploitation of the palm—a special chapter is devoted to the Palm Oil Industry.

Palm oil is used for tinplate rolling, soap making, &c., and there is an expanding market in Great Britain, Germany and North America. Quite apart from this there is a considerable domestic demand, as the natives use it almost universally for cooking and eating. "The export of palm oil from Nigeria since 1900 has steadily increased from 55,000 to 120,000 tons, and that of palm kernels from 110,000 to 250,000 tons." Labour difficulties limit the efficiency of the industry and it is estimated that in "Western Calabar . . . only about 10 per cent. of the available fruit is gathered . . . the time occupied in climbing the trees and in carrying the produce to market in an area where transport facilities are few, limit the more rapid development of the industry. In addition . . . the amount of palm oil lost each year through primitive methods is not far less than the total export for the year."

It must be realised that there is a potential competition from the plantations in Sumatra and the Belgian Congo. With plantations and up-to-date machinery, their industries have great advantages over the natural product and must have a big future. In ten years it is estimated that the production of the Dutch Indies—apart from Congo and Malay—will exceed the present output of the whole of West Africa.

The efficiency of West Africa can, however, be increased; "the ideal arrangement being that the palms should be owned and cultivated by their native proprietors, who should collect the fruit and send it to a central mill . . . The difficulty will be to maintain a full supply of fruit for such a factory—a difficulty which arises from the fact that the supplying of fruit, instead of oil making, and nut-cracking, will involve a very great change in native family customs and internal village economy. Another difficulty is the natural inability of the bushman to understand fluctuations on the European market, and his suspicions that the white man is trying to swindle him when the price falls."

An increase in the number of mills is desirable and it is suggested that there should be a small area around the mills which would provide for a nucleus of cultivated palms, which would, firstly,

have an educative effect, and, secondly, provide a supply of fuel for the mill during slack times. At present, as was stated above, the extraction of oil is done by primitive and wasteful means. Furthermore, plantations palms would be low growing—having no cause to fight their way over surrounding vegetation—with the result that the difficulties of climbing would be reduced or even eliminated.

One difficulty in the way of the establishment of plantations has been political prejudice. The type of concession enjoyed by Lord Leverhulme in the Congo cannot be given in Nigeria. "The British Government have again and again laid down that under no circumstances will they undertake to provide compulsory labour for private profit in any British Dependency." With regard to the development of the industry Mr. Ormsby-Gore definitely states "I rule out any schemes for the development of the palm industry which involve (1) compulsory labour in any form, (2) compulsion to sell fruit at a particular price, (3) compulsion to sell to a particular individual or concessionnaire." It is held that "any industry on a peasant proprietorship basis is far more secure and resistant than often would appear." Rapid development in other countries may depress price, but the native has a certain standard of life which he wishes to maintain, and adverse prices will cause him to work all the harder. It is thought, however, that "the Government will have to set the example in several selected places, if only as object lessons to the natives," and that there "would seem to be no objection in principle to the Government guaranteeing experimental mills against loss for a reasonable period."

In conclusion one may say that the report is comprehensive and pleasingly written, it touches on many points common to all the Tropical Empire, and similar surveys of other colonies would be of inestimable value to the student and administrator.

G. W.

THE BRITISH EMPIRE VEGETATION COMMITTEE.

THIS new Committee was appointed by the Imperial Botanical Conference held in London in 1924. The chairman is Professor A. G. Tansley, F.R.S. (a pioneer in British geographical plant ecology) and the Secretary is Dr. T. F. Chipp, of the Royal Botanic Gardens, Kew, England. The object of the Committee is to register, and to issue abstracts of all future published work on the vegetation of the British Dominions and Colonies. By the courtesy of the British Ecological Society, the abstracts will appear periodically in *The Journal of Ecology*, published twice a year, and now in its fifteenth volume. Professor Tansley is the editor of this well-known journal. The Committee invites authors to furnish abstracts of their publications for the purpose of this scheme.

THE USINE STE. MADELEINE.

Visit by Staff and Students.

A LARGE number of the senior students from the College paid a visit to the Usine Ste. Madeleine on Wednesday the 30th March, on the invitation of the General Manager of the Estate. The expedition was organized by Mr. J. S. Dash, Professor of Agriculture, and others of the professorial staff who accompanied the party were, the Acting Principal (Mr. G. Evans), Professor Shephard, and Messrs. Wright, Croucher and Baker. Leaving by the early morning train, the party were met on arrival by Mr. G. C. Skinner, the General Manager, and Mr. G. A. Jones, the Agronomist of the Company, and motored to the Sugar Factory.

The morning was spent in a visit to the Factory, the College party being conducted round the works in small groups, under the leadership of members of the Usine Company. This arrangement proved most satisfactory, and an ample opportunity was afforded to every one to study the various processes of manufacturing sugar by modern methods, and of dealing adequately with by-products. In this connection, particular interest was evinced in the new development that is taking place in the utilization of surplus megasse. Furnace designs are so perfect nowadays, and the elimination of waste in steam has been so largely obviated, that in modern factories, such as the Usine Ste. Madeleine, there is now a surplus of megasse over and above the fuel requirements. The utilization of megasse for such purposes as the manufacture of "Cellutex" and other artificial board material is therefore becoming a practical proposition, whilst its utilization for the manufacture of pulp, and in connection with the artificial silk industry is a matter that is bound to receive considerable investigation in the near future.

Members of the College experienced the famous hospitality for which the Company is renowned at lunch, which was presided over by Mr. Skinner, and his remarks with regard to the desire of the Usine Ste. Madeleine to continue its associations with the College as regards the development of science in agriculture, were much appreciated.

A strenuous afternoon was spent in the field. Owing to the undulating nature of much of the Usine country, it has been found by experience that heavy tractors are the best means of ploughing the land, and an inspection of the different types in use proved most instructive. Discussions on cane pests, and the merits of different cane seedlings, were a valuable addition to the day's programme.

The party returned by motors supplied by the Company, at five thirty, and carried away with them memories, not only of an unbounded and cordial hospitality, but also of a day well spent, and an impression of a wonderfully efficient organization, which is doing a great deal to raise, by force of example, the whole level of sugar production in the West Indies.

G. E.

MYCOLOGICAL NOTES.

I.

Two root rotting diseases of adult cotton plants, previously unrecorded in the West Indies, have recently been found to affect several varieties at the Research Station of the Cotton Corporation in Trinidad.

The imperfect stages of the two fungi causing these diseases both belong to the genus Rhizoctonia. One of the diseases which is popularly known as Root-Rot is caused by the fungus *Rhizoctonia bataticola* (Taub) Butler. This has been previously observed causing a wilting of adult cotton in India and Egypt. It is also known on several other host plants in different parts of the world.

Attempts have been made both in India ([2]) and Egypt ([1]) to reproduce the disease on adult cotton by inoculating plants with cultures of the fungus, but without success. This may be explained by the fact that Sawada ([4]) in Japan, and Finlow ([5]) in India have shown that there is a definite correlation between potash deficiency in the soil and the incidence of the disease as it affects Jute. Investigations are now being carried out to ascertain whether the above findings are applicable to the conditions under which the disease affects cotton in Trinidad.

Both Shaw ([5]) and Sawada have, in view of their obtaining a pycnidial stage of the fungus, identified it as *Macrophoma Corchori* Saw. It is not proposed to go fully into the taxonomic history in this short note since Ashby has informed the writer in a letter that in view of his recent findings there is a likelihood of the fungus being given a fresh name in the near future.

The second disease is known on several host plants other than cotton, in Europe and the United States. It is generally known as Violet Root-Rot and is caused by *Rhizoctonia Crocorum* Pers. (D.C.). Duggar ([3]) states that no well authenticated instance of the occurrence of this in South America, Australia, Asia, or Africa has come to his attention. So far as is known the fungus has not been previously recorded on the cotton plant elsewhere.

Field observations in Trinidad show that the following varieties of cotton are susceptible to the diseases :—

Rhizoctonia Crocorum (*Pers.*) *D.C.*	*Rhizoctonia bataticola* (*Taub.*) *Butler.*
Nanking.	Nanking.
Dharwar American.	Dharwar American.
Broack Type (G. herbaceum) 1A 9.	
Sea Island A N.	Sea Island A N.
	Cawnpore (G. arboreum).
	Million Dollar.
	Buri from Nagpur.
	Upland Cassava.

The following figures show the extent of the diseases in a plot one half of which had been given a dressing of Pen Manure before sowing :—

Manured.	*Unmanured.*
Number of Health plants 87	Number of Healthy plants 91
Number of Diseased plants .. .. Nil.	Number of plants with R. Crocorum ..20
	Number of plants with R. bataticola .. 1
	Number of plants with R. crocorum and R. bataticola .. 5

In another plot which had not been given any manuring 3 per cent. were affected with *R. bataticola* and 1 per cent. with *R. crocorum*.

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II.

The following point in mycological technique has been discussed with several mycologists from time to time and some of them have since used it with success. It may be found to save trouble to workers who may have to isolate their fungi in draughty rooms and particularly in tropical countries where accommodation and equipment is not always all that can be desired.

In making isolations of pathogenes from diseased material the usual procedure may be briefly described as follows :—Some of the spores, tiny pieces of the diseased material, or fragments of mycelium are placed in sterilised water in a test-tube or in a drop of sterile water on a flamed slide. A platinum loop is then flamed and a loop full of the water with spores or material in suspension is transferred into a test-tube containing melted agar at the required temperature and mixed. The melted agar with spores in suspension is then poured into a sterilised Petri dish. Subcultures are then made later from the colonies produced in the Petri dish. It is often the case, however, that quick growing fungus weeds and bacteria are very troublesome and seriously contaminate the Petri dish cultures. This can frequently be avoided by allowing the agar in the test-tube to cool to a point so that, after pouring into the

Petri dish, sufficient agar will be left in the test-tube to form a thin coating round the sides of the test-tube. If in addition to the Petri dish, the test-tube is also retained subcultures can almost always be made from tiny colonies on the film of medium round the test-tube. This film is not exposed to contamination to the same extent as the Petri dish. Additional advantages over the Petri dish is derived from the fact that the medium is in the form of a thin film. The growth of the colonies is not so rapid that they grow into one another quickly, and incidentally the colonies on the thin film of medium often produce spores in a shorter time than in the thicker and moister medium in the Petri dish. Preliminary examination with a lense also assists in spotting the common weeds since these can often be recognised by their method of growth at a very early stage. Further, the colonies in the test-tube can be examined on several occasions without fear of further contamination, whereas with the Petri dish there is danger each time the lid is tilted. Lastly a Petri dish on cooling sucks in air and with it fungus spores and bacteria.

* * *

III.

When an inoculating chamber is used for culture work it is often desirable to free it of fungus spores and bacteria. For this purpose commercial formalin is often used, but there is the serious objection that several days must pass before one can enter and work in the cabinet owing to the discomfort caused by formalin vapour. It has been found that it is not necessary to sterilise the chamber to avoid contamination. All that need be done is to boil some water and allow the steam to condense. The condensed moisture on the sides of the chamber holds down bacteria and fungus spores very effectively. It need hardly be pointed out that the effectiveness of the operation ceases as soon as the chamber becomes dry.

H. R. Briton-Jones.

BRITISH INDUSTRIES FAIR.

The opportunity presented by the British Industries Fair was seized by the Imperial Institute to make a most attractive display of products from different parts of the Empire. A series of timbers, bamboos, and grasses from New Zealand, British Guiana, East, West, and South Africa, and Malaya, which could be utilized for the manufacture of pulp and paper, was shown, together with specimens of the paper produced in the Institute laboratories. Oilseeds, yielding edible oils, were exhibited from West Africa, British Guiana, British Honduras, and North Borneo, and at the present time the Institute is investigating the possible extension of the use of Shea butter from West Africa for edible purposes.

Another exhibit illustrated the work of the Institute's Silk Committee. Silk, reeled from cocoons from Jamaica, Rhodesia, and Iraq, and fabrics woven from the silk were also shown. An exhibit was devoted to recent discoveries in British Africa showing samples of the platinum ores of the Potgietersrust district in the Transvaal. There were also samples of tin ore from Tanganyika, and manganese ore from the Postmasburg district in Cape Colony. Hematite ore discovered in Sierra Leone was shown.

An entirely new feature this year was the display arranged by the Empire Marketing Board, occupying 10,000 square feet. Here were shown the important commercial products of the Mother Country and the Oversea Dominions. Australia, New Zealand, India, Southern Rhodesia, East Africa, Sierra Leone, the Gold Coast, the British West Indies, British Guiana, Northern Ireland, and the Irish Free State were all represented, and among the novel exhibits in this market-place of the Empire were hair-brush backs manufactured from New Zealand milk and "bouncing pottery" made of balata from British Guiana.

The total attendance at the Fair was stated by the Department of Overseas Trade to have been 99,847 of whom approximately 75 per cent. consisted of trade buyers, representing 61 countries, and 25 per cent. of the public. The number of buyers showed an increase of 26 per cent. over last year, and it is significant that over 100 buyers came from as distant a country as Australia. Holland again led European countries in numbers, and the German representation showed an increase of 100 per cent. The following views have been expressed :—

Sir James Parr, High Commissioner for New Zealand, said the exhibition had undoubtedly given the Dominion's products a most useful publicity.

Mr. A. E. Hyland, Director of Australian Trade Publicity, said they could regard the results attained at the Fair as very satisfactory.

Mr. H. A. F. Lindsay, Trade Commissioner for India in London, said the High Commissioner for India was most gratified with the results of the display of India's goods at both the White City and Olympia; there were keen inquiries from all European countries, from across the Atlantic and the Pacific Oceans, from Africa and from many remote lands for cereals, minerals, leather and textiles.

Mr. Algernon Aspinall, Secretary to the West India Committee in London, said their exhibit at the Fair had proved so successful that it was reappearing at Olympia, where visitors now had an opportunity of handling West Indian products and learning something about the amenities of the "Islands of Sunshine."

Mr. J. S. Caines, Trade Commissioner for British Guiana in London, said the arrangements made by the Empire Marketing Board were well nigh perfect, and inquiries of all kinds were steadily coming in.

The Editor will be pleased to send a gratuitous specimen copy of *Tropical Agriculture*, post free, to anyone interested in tropical development.

TROPICAL WORLD NOTES.

Southern Rhodesia.

The planting season in Southern Rhodesia opened very favourably, but was followed by extremely droughty conditions which caused serious anxiety in regard to crop prospects for the year. Fortunately towards the end of January, good rains fell and the future of the crops at the time of writing is well assured. It is of interest to record that whereas last year there were only some 336 growers of tobacco in Southern Rhodesia, this year the number has increased to 681, while the acreage under tobacco has risen from 1,300 odd acres in 1926 to between 18,000 and 20,000 acres this year.

The Government has recently appointed ten District Tobacco Advisers, nine of whom have been recruited in the United States of America. Each of these officers is given a district containing a considerable number of inexperienced tobacco growers and each is expected to visit the growers in his area as often as possible each month, in order to advise them on all the problems of growing tobacco, curing, picking, grading and so forth. It is believed that the appointment of these officers will add many thousands of pounds to the wealth of Rhodesian farmers this year.

Cotton, owing to two unfavourable seasons and to current low prices has rather fallen from favour, with the result that the acreage of land planted to maize will this year show a large increase over any previous year. The value of cotton as a rotation crop has been demonstrated, and land which has been for one or two years down to cotton, may be expected to give considerably heavier yields of maize than it previously did. At the time of writing the maize outlook is most favourable and this season's crop should easily establish a record for Southern Rhodesia.

The practise of green manuring is becoming increasingly popular and the last statistical returns showed many thousands of acres of green manuring crops planted for ploughing under.

* * *

St. Lucia.

A serious crisis has arisen in St. Lucia through the suspension of operations by the Swift Banana Company, Ltd., in the Island. This Company was formed last year with the object of developing the cultivation of and providing for the shipment of bananas. Very considerable areas in the Island had already been cleared of forest and put under bananas, while the planting community was also encouraged to embark on banana cultivation on a considerable scale. The West India Committee are in commnnication with the Colonial Office, and every effort is being made to find some Company willing to provide steamers for the carriage of the fruit.—(*The West India Committee Circular*, Vol. XLII, p. 103.)

Kenya Colony.

The rainfall for the year 1925 was unsatisfactory and many areas suffered from drought. In fact, fears were entertained at one time in regard to food supplies in the native reserves, but no serious shortage occurred. The scarcity of labour, the high cost of draught oxen and the higher value of land have all resulted in the increased interest taken in the use of agricultural tractors. In spite of the decrease in available labour, the area under cultivation on European farms, has advanced from an average of 214 acres per occupier in 1924 to 232 acres in 1925. Of the main crops produced on European holdings, the area under maize increased by ten per cent. to 155,916 acres, which maintained a high average yield. Coffee acreage showed an increase of eight per cent. over the previous year, the total acreage being 65,140; but owing to the drought, yield and quality were lower. The value of coffee to the Colony cannot be overestimated, since its value amounts to nearly one-third of the total exports from the Colony, and what is still more important, forty per cent. of the European owners and occupiers of land are coffee growers. The factor which limits the more rapid extension of the area under coffee is the uncertainty in regard to labour supplies. The Sisal industry is in a flourishing condition, 52,872 acres being under crop, of which roughly two-thirds is over three years old and available for cutting. The yield from the wheat crop was 61,067 bags as compared with 55,920 in the previous year. Large increases are recorded in the areas under sugar-cane and barley. But the production of sugar, as yet, only meets a portion of the local requirement. Barley of good malting sample can be grown in Kenya and satisfactory yields have been obtained.—*Colonial Report, No.* 1321.

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Belgian Congo.

Monsieur E. Laplae has recently contributed to the *Revue de Botanique Appliquee et d' Agriculture Coloniale* the results of some tapping experiments carried out on the Yangambi-Gazi experimental Hevea Plantation in the Belgian Congo. There was in tapping on this plantation in 1924 an area of 327 hectares with 54,700 trees. The tapping was carried out by 54 men under five headmen, each man tapping 300-320 trees daily. It was found possible to tap on 25 days in each month without rain and on two rainy days monthly. Rain stopped operations only on an average of two days a month. The work was well carried out by the native tappers; the bark consumption was reduced to a point allowing for twelve years' bark renewal period. The method adopted was the single cut daily on half circumference. For experimental purposes an area of 48 hectares was set aside for periodical tapping (alternate months). The total yield was very much the same for both methods.—(*The India-Rubber Journal*, Vol. LXXIII, p. 2.)

Barbados.

The following has been received from a correspondent :—

"While in Barbados recently I noticed on the Garrison Savannah patches of a grass which were particularly conspicuous, standing out as they did against the normal herbage of that area.

Specimens of this grass were sent to Washington for identification. Dr. A. S. Hitchcock, Senior Botanist in charge of Systematic Agrostology of the Bureau of Plant Industry examined the material and his account of it is as follows :—

'The enclosed grass is *Themeda arguens* (L.) Hack. This is a grass of Asia which has recently been introduced into the West Indies. We have specimens from Morant Bay and Troy in Jamaica. It is known as Christmas grass. It is a kind of plant that is likely to spread and may become a nuisance when established because of the sharp pointed fruits.'

In Barbados it appeared to be likely to become more than a nuisance, as it seemed to be able to overcome the sour-grass and the devil's grass, which are the principal grazing grasses in that Island, and itself not to be at all attractive to grazing stock.

It is understood that the Barbados Department of Agriculture is taking energetic steps to eradicate this grass while it is still restricted in its distribution in this Island."

* * *

British Malaya.

British Malaya has passed through a period of prosperity during two years at least. The community as a whole has been benefiting by the extremely active state of the rubber market and the fall in the price of that commodity has caused no marked reaction on the general purchasing power of the country, partly because British Malaya is by no means dependent upon one crop. During the past three years exports of tin have remained very steady, and last season good shipments of copra, areca nuts, rattans, pineapples, and fish have added to the general business activity. For two years in succession there has been a favourable balance of trade of between £30,000,000 and £40,000,000. In 1926 the total value of imports was £116,982,000 and of exports £146,827,000, an export surplus of nearly £30,000,000, while in the previous year there was a similar surplus of £36,470,000. Railway earnings show steady increases, and the estimated revenue of the country this year is £82,000,000. In all the circumstances British Malaya should prove very attractive as an import market. The damage arising from the floods which took place at Christmas and the New Year on the east coast has had little effect on the purchasing power of the community, the financial position being sufficiently strong to permit of the necessary replacements being purchased without delay.—(*The Times Trade and Engineering Supplement*, Vol. XX, p. 4.).

Nicaragua.

Nicaragua is the largest of the Central American countries, with an area of 49,000 square miles. Agriculture is far and away the leading industry. In 1925 coffee, bananas and sugar made up 72 per cent. of the total value of all exports. In 1926 the United States took 65 per cent. of all coffee exported, France 14 per cent. and Holland 3 per cent. The increase in coffee production from 25,450,000 lb. annual average for the ten-year period 1913-23 to an average of 36,000,000 lb. for the last few years is due largely to increased acreage in the Matagalpa district and improved cultivation of old plantings. Bananas rank next to coffee. Sugar is the third agricultural product of export value, about 5,000 acres now being cultivated. Lumbering, in value of exports, ranks next to agriculture. Mahogany leads the list. In 1925, 19,802,000 board feet, with a value of $1,567,000, were shipped. Practically all went to the United States. Other lumber products are cedar, rosewood, cocobolo, guyacan, dyewoods and balsam. Mining is confined chiefly to gold and silver, and is retarded by political unrest and lack of transportation facilities. Manufacturing is extremely limited. Alcohol and rum are made from the molasses by-product of sugar refining. The Government control of the manufacture of alcohol yields an annual revenue of $500,000 to $750,000. There are also a few small factories making soap, candles, shoes, pottery tiles and bricks, rubber coats and furniture.—(*The Chamber of Commerce Journal*, Vol. LIII, p. 295.)

* * *

Ecuador.

We learn from the *Boletin de la Dirección Agropecuaria del Litoral* that the Government of Ecuador has established as a branch of the Department of Agriculture a section for the encouragement of the export trade, which is working with the free co-operation of agriculturists and exporters to standardize all exportable agricultural products by adopting fixed types and grades. Certificates will be granted by the board and products which are not up to a given standard will not be allowed to be exported. Samples will be periodically supplied to the Commercial Agencies of Ecuador in the main consuming centres.

* * *

French Africa.

The question of the Trans-Saharan Railway is again one of the most important topics in the Metropolitan and Colonial Press in France. Actually, travel by sea from France to the Sudan requires above twenty days, whereas by a Saharan railway it would take only seven or eight days. In addition to its military importance, however, the Trans-Saharan—the principal aim of which is to link French Black Africa with the Mediterranean Sea—is to improve on a large scale the wealthy French possessions extending along both banks of the River Niger. The powerful railway company, Paris-Lyon-Mediterranean has notified its desire to be appointed "concessionnaire" of the Trans-Saharan.

THE COLLEGE.

"BEACONS OF LIGHT, Watson," said Sherlock Holmes, pointing to the towering blocks of the public elementary schools as the train ran through the environs of the city. Sir A. Conan Doyle's apt description leaps to the mind when one endeavours to find a suitable phrase for the group of red-roofed buildings that constitute the College of Tropical Agriculture at Trinidad. Indeed it is difficult to conceive any direction in which expenditure could be made with greater certainty of rich return than in the development of the project foreshadowed by Mr. Amery for a chain of similar institutions stretching round the Empire.

Agriculture in the tropics is in reality an eternal struggle against disaster. When the pitiless hurricane sweeps across some fertile island, bringing in its train a sequence of ruin and destruction, there are telegrams in the London papers to acquaint the home dwellers with the extent of the loss; when earthquake or volcanic eruption overwhelms the inhabitants, the camera brings the scene of desolation before our eyes; but the ravages of plant diseases and the depredations of insect pests are not less terrible, though their insidious progress is scarcely noted save by those to whom they bring ruin in a very terrible form.

The ravages in the cotton-fields of the boll-weevil and of the pink boll-worm are perhaps more familiar than the dreaded Panama disease that is making it impossible to continue the cultivation of bananas in many fertile localities, or the pestilence of the "froghoppers" that destroy the canefields, but in every direction in the Tropics there are "little foxes" that bring to naught man's most careful husbandry. Yet it should be remembered that the attacks of parasitical insects and the onslaught of mysterious diseases differ from the cataclysms of earthquake and hurricane in this essential point, that they are not wholly beyond the control of human intelligence.

A Great Example.

The patient researches of scientific men who have devoted their lives to the task have already given mankind practical immunity from some deadly diseases. Tens of thousands of lives were lost in the canal zone of Panama before man's intelligence discovered the disease carriers and triumphed at last, and the remembrance of such conquests encourages the belief that the day will come when the most dreaded plant diseases will also be brought under control.

But before that victory is won a great battle must be waged over a wide front. In that struggle the microscope of the professor takes the place of the scouting party, the spraying machine represents the quick-firer, insecticide is a munition of war, and the implements of cultivation are substituted for the rifles and bayonets of the infantry. If we carry the analogy further we see that in this war on pests and diseases the College of Tropical Agriculture resembles the Military College at Sandhurst. There strategy and tactics alike find a place, and there are trained the men who will direct the fight. Some of them have already borne the heat and burden of the day in the field; there are courses for staff officers at Camberley and courses in Trinidad for experienced planters who wish to specialize in particular branches. They differ essentially from those designed for students, who are only on the threshold of their career.

Just as at Sandhurst the cadet has part of his training in the lecture-room and part in the field, so the curriculum of the college includes both theoretical and practical instruction. The loboratories and the lecture-rooms each have their special function. In addition a model sugar factory equipped by the generosity of British manufacturers is a welcome testimony to the interest taken in the work by British industry. The experimental plots where new products are being grown and new varieties of established products tried are evidence of the enthusiasm with which every branch of the work is conducted.

The Bug-Hunters.

While some of the professors are exploring the life history of pests as the essential preliminary to the discovery of effective remedies against them, others are endeavouring by cross-fertilization to create new species of plants that will be immune from attack and are demonstrating methods of culture that minimize the loss caused by disease and pest. Experimental plots of jute—hitherto grown on a commercial scale only in India—of tobacco, and of flax are evidence of an incorrigible optimism that will surely bear fruit in other directions if these particular efforts are unavailing.

But optimism is not the exclusive characteristic of the teaching staff. The college is still in process of building, but there are plans in existence that reveal to anyone who may be privileged to get a glimpse of them that the age is not yet past when old men dream dreams and young men see visions. Those carefully drawn blue prints represents a vision—and a noble vision—of what may one day be an accomplished fact. It would be unfair on the evidence of a brief visit to offer any serious criticism of what has been done in the past, but it is impossible not to be struck by the relatively low cost of buildings in course of construction. It would certainly seem that future extension may be safely left to those on the spot. The accommodation for students is not yet in every respect satisfactory. If the college is to develop a tradition worthy of its importance the hostel system must be extended and the students brought into a closer community.

The advantages of the training provided ought to be more widely known. It is by no means a royal road to success in life to send a boy to the college; unless he has a natural aptitude for the life of a planter and an inborn love of agriculture the course will not benefit him very much. But given a sound education and a real enthusiasm for the work the student who takes a full course may

look forward with some confidence to obtaining fairly good employment at its close. But whether there would be sufficient opportunities for all the students if their number were greatly increased is more doubtful. In that respect the cordial co-operation of planters is vital to success, and no efforts should be spared to arouse their interest and secure their practical and enthusiastic support.

The Ideal system of Control.

It is very difficult to avoid the conclusion that the college is very much better without the embarrassing solicitude of Government control. It seems to be a case for beneficent autocracy. It must of course be under the control of a board of some kind, but particularly in this critical stage of its evolution the governance of a strong man, enjoying the entire confidence of the board, a man inspired by enthusiasm for his task, understanding it in every phase and willing to devote a great part of his time to it, is the ideal system of control from this side.

Unfortunately in some quarters the importance of the principle at stake in the establishment of the college is not realized. There are actually people who because they think some other part of the region ought to have been chosen as the site for the college look coldly on the whole project. Is this a worthy attitude for any patriotic citizen to adopt? Is it not rather evidence of failure to understand the vital principle at issue? "In the tropics," said one thoughtful citizen in Jamaica to the present writer, "science is the gateway to prosperity." He is absolutely right. If British Guiana, British Honduras, Jamaica, Trinidad, and all the other British West Indian Islands are to move forward to an era of increasing prosperity and a rising standard of living they can only do so by adopting with enthusiasm an attitude of active interest in scientific research.

Details of the work.

The report of the Principal of the Imperial College of Tropical Agriculture for 1925-26, published with the prospectus for 1927-28, states that to the diploma course eight students were admitted, bringing the total to fifteen. To take the post-graduate course qualifying for the associateship thirteen students were admitted, of whom seven were sent by the Empire Cotton Growing Corporation and two by the Colonial Office. One diploma student returned to take the fourth year in sugar technology. Three students took the special one-year course, while three members of the staffs of factories situate in Trinidad attended for a few months.

The field from which students are drawn is ever widening. In addition to the West Indies and the United Kingdom four students in residence during the year have come from the Union of South Africa, and one each from Brazil, Egypt, and Ecuador. Students who have passed through the college, it is noted, are now employed in South Africa, Southern Rhodesia, Uganda, Nigeria, the Gold Coast, the Sudan, Ceylon, Barbados, Trinidad, Antigua, and British Guiana.

The new building was completed and occupied in the course of the year, and progress has been made with the provision of a hostel, though construction will take too long for its use for the session 1926-27. Approximately 12 acres of the estate have been brought under cultivation, and a further area is being added. The total cultivated area, it is stated, remains too small for the requirements of research and teaching, and further facilities are needed.

On 23rd November last the Imperial College was granted a Royal Charter, and takes its place as "one of the essential keystones in the structure of tropical agricultural development."—(*The Times Trade and Engineering Supplement.*)

THE COLLEGE SUGAR FACTORY.

THE Experimental Sugar Factory began operations on the 15th March, 1927. The cane supply is obtained from fields of the Cotton Research Station, and from the College Experimental plots. The factory operates on one shift only, the mills grinding from 6.00 a.m. to 4.00 p.m. leaving two hours daily for the liquidation of the boiling house. Various processes of cane-sugar manufacture and refining will be demonstrated during the period of operations, which is expected to last about nine weeks.

Sugar Technology students divide their time between the factory and the Laboratory. In addition to the ordinary chemical control of manufacture, a short research programme has been arranged which aims at following the removal of certain non-sugars during the course of manufacture.

The factory will help in obtaining as reliable data as possible from the field experimental plots; each variety from the plots will be ground separately and should yield better average figures than are usually obtained from a laboratory mill sample. It is also planned to carry out experiments on the deterioration of cane on a larger scale than is usually the case.

A considerable improvement in sucrose contents and purities of juice over the extremely low figures, which characterized the cane received during the first ten days has been recently noted. This improvement is largely due to more settled weather, and better control of cutting operations. The quality of the sugar manufactured to date (which includes Demerara Crystals and Washed Grey Crystals) has elicited favourable comments in local sugar circles.

THE following appointments have been made by the Secretary of State for the Colonies:—

Mr. G. Rocker, M.R.C.V.S., Veterinary Surgeon, Strait Settlements; Lieut. T. McEwen, B.SC., Senior Agricultural Research Officer, Northern Rhodesia; and Lt. J. W. Nicholson, Adviser of Forestry, Kenya and Uganda.

INSECT CONTROL IN HAWAII.

(*Continued.*)

The Anomala Beetle.

IN the case of the Lamellicorn beetle, *Anomala, orientalis*, a remarkably complete degree of control has been achieved. This insect was probably introduced in potted plants when it entered the Territory prior to 1910. Fortunately, the infestation is a localised one as the larvae, when abundant, nearly or quite kill out the cane. It has been observed that the female beetles commonly deposit their eggs prior to flight which fact seems to explain its restricted distribution. Attempts have been made to restrain this insect by importing about twelve species of parasites from several countries, but the only kind that has become established is the solitary wasp, *Scolia maniliae*. This insect was obtained by Muir in the Philippines and he transmitted the first consignment to Honolulu in November, 1915. The early shipments were small and gave poor results, but with the assistance rendered by H. T. Osborn, and later by F. X. Williams, it became possible to send over material on a more considerable scale. In September, 1916, the first recovery of the *Scolia* was made in the field and, by June, 1917, it had established itself over a considerable part of the area infested by the *Anomala*. It occupies to-day a zone far beyond that appropriated by its host, it being found in varying abundance on most of the larger Islands and in localities where the *Anomala* is wanting. In these situations it maintains itself by parasitising larvae of the allied beetle *Adoretus sinicus*, which entered the Islands a number of years previously from Japan. There is no doubt that *Scolia maniliae* has proved to be a most beneficial species and its activities are such that the larvae of the *Anomala* are sufficiently restrained from increasing to their former destructive proportions. The beetle has been confined to the region which has occupied for several years past and although, at the present time it is very slowly spreading, it is doing so in small numbers only.

The Avocado Mealy Bug.

The Avocado mealy bug, *Pseudococcus nipae*, has for a long time past been a serious pest. It infests bananas, alligator pears, figs, guavas, &c., causing the leaves to fall several times in the year Its control has been achieved only quite recently through the efforts of H. T. Osborn in Mexico. This entomologist was able, in 1922, to secure material of an internal parasite, *Pseudaphycus utilis*, belonging to the Chalcid family Encyrtidae. This insect in the relatively short period of about two years, has proved remarkably effective and in many localities at the present day the mealy bug is difficult to find. Two Coccinellid beetles *Hyperaspis silvestrii* and *Curinus coeruleus*, were also brought over at the same time and have played some small part in the control of the same insect. These beneficial insects are now well established on the Islands of Oahu, Maui and Hawaii.

Pyralid Leaf-Rollers.

The indigenous Pyralid leaf rollers *Omiodes accepta* (Butl.) of the sugar-cane and *O. blackburni* (Butl.) of palms are among the very few native insects of injurious propensities. They have, in the past, caused considerable damage but at the present day they are no longer regarded as pests of any serious consequence. They are aparasitised by a considerable number of enemies, some of the latter being indigenous, but the most efficient pertain to species that have been introduced. In some seasons and in certain localities outbreaks of *Omiodes* occur and it appears that, on such occasions, the prolific breeding of these moths temporarily enables them to outstrip the restraint exercised by their parasites. It is noteworthy that none of these parasites, whether indigenous or introduced, confine their activities solely to the *Omiodes*, but affect other lepidopterous hosts also. The most important parasite is considered to be the Braconid *Macroydctium omiodivorum* Terry, which was probably introduced by Koebele from Japan in 1895. As many as 75 per cent. of the larvae of *O. accepta* have been known to be destroyed by this species. *Chalcis obscurata* Walk, was likewise brought in by Koebele from Japan at the same time and from China a year later. It very quickly became established and is now common throughout most of the Islands. The well-known Chalcid *Trichogramma pretiosa* Riley was introduced by Koebele from the United States prior to 1900. No detailed studies have been made as to the intensity of its parasitism but it is the only egg parasite affecting the *Omiodes*. The Tachinid *Frontina archippivora* (Will.) probably got accidently imported from the United States and has subsequently adopted a wide range of lepidopterous hosts in the Hawaiian Islands. It can only be regarded of accessory value in so far as *Omiodes* is concerned and it has not been possible to gather any information regarding the extent to which it parasitises that genus.

MACHINERY to effect the Dutch invention for the spinning and weaving of coconut fibre has been constructed at the works of Messrs. Fairbairn, Lawson, Combe, Barbour, at Belfast. These comprised :—(1) Husk-removing machine, which at the same time loosens the coconut fibre and crushes the hard shell surrounding the kernel ; (2) apparatus for drying the kernel, which produces a product at least equal to the sun-dried copra, but of more uniform quality ; (3) fibre-obtaining machine, which within two hours produces the fibre from the husk by a purely mechanical process ; (4) complete spinning plant (ordinary spinning machines with only slight adaptations) ; (5) weaving machines.

SUGAR NOTES.

Compiled by the College Department of Sugar Technology.

Progress of Sugar Technology in 1926.

In an interesting article in *Facts About Sugar*. Dr. O. W. Willcox reviews the progress made in the fields of research, investigation and invention in various branches of the sugar industry during 1926. He considers that the year has been characterized chiefly by efforts toward further development of previously opened lines rather than by the discovery of basically new facts or principles.

Agriculture.

The famous H-109, BH (10) 12, and SC 12/4 varieties are still being extended to new localities and are not confronted by serious rivals. The new variety P.O.J. 2878 is proving a valuable acquisition. The Falkiner Cane harvester and topper has withstood its first practical trials and has been pronounced a success under certain Australian conditions. Satisfactory progress has been made in the study of control measures for mosaic and, in the introduction of resistant varieties. Important contributions concerning knowledge of fertilizer requirements and scientific irrigation of the sugar-cane have been made by Hawaiian Technologists. The cane borer problem is being investigated in Java.

Manufacture.

There was some activity in the invention of new methods of treating sugar juices. The use of chlorine in sugar refining has been proposed, and its possibilities studied. Another substance which has come up for consideration in the purification of beet juices is pepsin, which has a special action on albumincids. Several elaborate studies have been made to discover the connection between temperature, time and the decomposition and discoloration of sugar juices. The conclusions reached are that if the juice is exposed but a short time to the high temperature there is little or no deterioration, whereas 30 minutes at 115°C. or more is uneconomical.

An official commission in Russia announces that a problem of long standing, the continuous boiling and crystallization of sugar juices, has definitely been solved. The principle of boiling under conditions of constant purity has been successfully applied in Java.

A process to permit the recovery of sucrose from cane molasses has been worked out; it depends on the selective fermentation of the reducing sugars by special yearts which do not attack sucrose.

Decolorizing carbons have claimed a great deal of attention; the chief item of interest as regards the sugar-cane branch of the industry being the successful employment of a vegetable carbon in the manufacture of granulated sugar in the tropics.

Engineering.

In the preparation of cane for milling the use of a crusher-shredder has found favour in South Africa and Cuba. Several new designs of Megass-furnaces have been proposed during the year. Heat economy has received due attention. Proponents of pressure evaporation have continued to pile up evidence that this system cuts down coal consumption in beet sugar factories. Another means of heat economy which has received practical attention is vapour compression, which is now in actual use in some European sugar factories.

The Lafeuille tubular crystallizer has been further improved by modifications which convert it into an evaporator crystallizer which seems to have great possibilities. A drawback to this equipment is its cost.

A new and practical juice weighing scales has met with commercial success.

Chemistry.

Determinations of the pH for optimum clarification of beet and cane sugar juices; also of the proper pH for escaping inversion on the one hand, and discoloration on the other during boiling have been made. Important contributions on the buffering of sugar solution have appeared.

The Swedish chemist Lunden, in the course of fundamental work on the colorimetry of sugar solutions has demonstrated that the spectrophotometer is an instrument of great practical value in the sugar factory laboratory. Lunden has also introduced a new concept, that of latent colour, which he applies to colourless constituents of crude juice which becomes coloured during evaporation. The measurement of surface tension of sugar solutions has been further improved by the substitution of the stalagmometer for the De Nouy tensimeter. Java chemists have been experimenting with enormously increased amounts of finely divided lime carbonate to effect complete entanglement of suspended matter without introduction of excess lime into the solution.

Work on the crystallization of sucrose, and the influence of other dissolved substances on crystallization has been published by Kucharinko and his co-workers. New, and perhaps definite theories on the nature of molasses have been proposed by Toedt and others.

PROPOSED WEST INDIAN UNIVERSITY.

THE suggestion for the founding of a West Indian University, which had been favourably entertained at the West India Conference in London last year, came before the Jamaican Legislature on 3rd March. A resolution was adopted that the Governor be requested to seek the views of the constituent colonies of the West Indian Standing Conference on the subject and to state that Jamaica was willing to co-operate with them towards the establishment of a university.—*The Times.*

COTTON PLANTS.

A note on the Vegetative Propagation.

By S. C. HARLAND, D.SC. (Lond.),

Department of Genetics, Cotton Research Station, Trinidad.

EVERY worker on the cotton plant feels sooner or later the need of some rapid and easy method of propagating a single plant on a large scale. The need is felt most urgently when it is desired to effect a rapid multiplication of a pure line up to commercial proportions. It also arises in genetics where a large number of seeds is often required from a single plant in order to decide questions of doubtful segregation, ratios, &c. In the genetic studies now being carried on in Trinidad, several cases have been met with of plants which, though valuable from a genetic point of view, are subnormal in vigour, and which can best be kept alive by grafting on to a more vigorous stock.

Cotton may be budded, grafted, or grown from cuttings. Budding of cotton was first carried out in Hawaii (1909), where E. C. Smith was able to bud desirable types of Carovonica cotton on to stocks of poorer quality. The writer budded large numbers of cottons in St. Vincent (1917), and found that the West Indian perennial, or tree cotton (*G. purpurascens*), was an exceptionally good stock for Sea Island cotton.

Meade, in the United States, grafted American on to Indian cotton, and *vice versa*. The propagation of cotton from cuttings was successfully attempted in Hawaii (*loc. cit.*), and Longfield Smith, using this method in St. Croix in 1913, was also able to strike hardwood cuttings, though the percentage of successes was not high. The writer found in St. Croix that softwood cuttings in sand rooted in about 10 per cent. of cases. Experiments carried on in England in the greenhouse at the Shirley Institute in 1923-26 showed that in lower temperatures, *circa* 70° to 78° F., softwood cuttings would root without the slightest difficulty in a few days.

A simple method for the rapid propagation of herbaceous plants has recently been described by Blakeslee and Farnham, and is termed by them "bottle grafting." Mr. E. E. Cheesman successfully applied this method to cotton at my suggestion two years ago, and since then several hundred plants have been grafted.

The method (*see* diagram) consists in utilizing seedlings of perennial cottons as stocks for the less vigorous Sea Island, Egyptian, and Upland types. The seeds are sown in bamboo pots and are grafted when a few inches high. A thin slice about 1 inch long is cut out of the side of the stock, and a similar slice out of the scion—a young shoot about 3 inches long. The two cut surfaces are fitted together and firmly wrapped with ordinary knitting wool. The cut end of the scion is placed in a tube containing water, and this serves to prevent the scion wilting until union has taken place. The head of the stock may be cut off in three weeks and the water removed.

The importance of this method to cotton-breeding work cannot be over-emphasized, and it is described here for the benefit of cotton workers in other countries. From a single plant during the growing season several hundred plants can be obtained in a few months, and any desirable strain propagated rapidly. Finally, it should be noted that, by grafting, a single plant may be made to produce enough lint for a spinning test.—*Empire Cotton Growing Review*, Vol. IV, No. 1.

REFERENCES.

1923, Blakeslee, A. F. and Farnham, M. E. "Bottle Grafting." Journal of Heredity, Vol. XIV, No. 4.

1909, Annual report of the Hawaii Agricultural Experiment Station.

1917, Harland, S.C. "Notes on Resistance to Cotton Leaf Blister Mite, with special reference to Budded Cotton and to Cotton Hybrids." *W. Ind. Bull.* Vol. XVI, pp. 78-81.

GRANT TO LIBRARY.

WHILE the last issue of the Journal was in the press news was received that the Carnegie Institution had very generously promised £1,000 towards the upkeep of the College Library. It is recognised that an adequate and up-to-date Library is essential for the proper functioning of such an institution as the College, but hitherto, progress has been very seriously retarded on account of the lack of funds.

When the functions of the Imperial Department of Agriculture were absorbed by the College, the nucleus of a valuable Library was acquired, but all Departments, particularly those which were not represented in the former Imperial Department, are deficient in text-books and scientific periodicals. The purchase of text-books and back sets and current numbers of periodicals, the binding of periodicals and pamphlets, the provision of adequate shelving and study accommodation, and the cataloguing of existing literature, in addition to the normal demands upon the Library, present an expensive and laborious problem.

We have to thank numerous publishers, both Governmental and private, institutions and private individuals, for their very valuable assistance in helping to bring the Library up-to-date. The timely and generous assistance of the Carnegie Institution will enable us to quicken the process by which the Library is being made competent to meet the demands it is called upon to fulfil.

The subscription to *Tropical Agriculture* is six shillings per annum, post free, to all countries within the British Empire or seven shillings, post free, to all other countries. Subscriptions can commence at any time during the year.

Diagram showing method of Bottle Grafting.
(*See page* 96.)

CHEMICAL NOTES.

Compiled by the College Department of Chemistry and Soil Science.

Sulphuric acid treatment of cotton seed.

Cotton seeds, when treated with sulphuric acid, germinate better than when sown without previous treatment. 500 gr. were treated with concentrated sulphuric acid (100 cc.) for 15 min., washed for 10 min. in 2 litres of water, and dried. Sown immediately after treatment, the seed showed 95 per cent. germination, and, after storage for 6 months, 92 per cent. In the field, treated seed germinated better than the untreated. Soaking the seeds in acid for longer periods than one hour, even with a dilution of 1 : 500, adversely affected their germinative power. Seeds infected with "Black Arm" were not completely sterilised by the acid treatment, but the active development of the disease was delayed, and young plants became well established before any injury was apparent.—R. G. Archibald (*Soil Sci.* 1927, 23, p.1.)

* * *

New Fertilizer Factory in Brazil.

A new factory is to be erected in Brazil by the Cia. Hidro-electrica de Adubos Chimicos e Alkalis, with the aid of subventions from the Federal and State Governments, for the manufacture of fertilisers by a process for the synthesis of ammonia from atmospheric nitrogen. The company anticipates an output of 75,000 tons both of nitrogenous and phosphatic fertilisers, and will make provision for increasing its capacity. At present, Brazilian agriculture consumes roughly 100,000 tons of nitrogenous fertilisers and 200,000 tons of phosphatic fertilisers annually, and the demand is growing.—*Chemistry and Industry*, 4th March, 1927.

* * *

A Vegetable Substitute for Horse Hair for Upholstery Stuffing.

The expansion of the motor-car trade has necessitated the use of large quantities of stuffing materials for seat cushions, and search has been made for substitutes for hair which heretofore has provided the chief stuffing material. In the March, 1927 number of *Industrial and Engineering Chemistry*, Dr. A. W. Schorger describes a vegetable fibre obtained from a well-known tropical epiphyte, variously named Old Man's Beard and Spanish moss (*Tillandsia usneoides*). This plant furnishes, when properly retted, the best substitute for hair yet discovered. Dr. Schorger has examined the chemical composition of Spanish moss, and has shown how the retting process may best be controlled.

* * *

Colouring Cement.

Mr. G. W. White of London has recently found that certain organic dyestuffs can be employed for permanently colouring cement. The cement is saturated with the dyestuff solution, so that the colouring matter becomes an integral part of the cement. — *Indus. Engin., Chem.* News Edition, 20th June, 1926.

Butyl alcohol and acetone from corn (maize).

When low-grade maize is made to ferment by means of cultures of *Clostridium acetobutylicum*, butyl alcohol, acetone, and ethyl alcohol are produced in the ratio of 6 : 3 : 1. This culture converts 3 lb. of starch into 1 lb. of mixed solvents in the form of a 2.5 per cent. solution. A mixture containing 45 per cent. H and 55 per cent. CO_2 is also evolved as by-product. The solvent mixture is passed through continuous stills, and the resulting crude spirit (50 per cent. solvents) is then fractionated.—D. H. Killeffer (*Ind. Eng. Chem.*, 1927, 19, 46-50).

* * *

Chemical Characterization of Rubber.

Different rubbers may be characterized by collecting the fractions obtained in dry distillation. A sample of Java crêpe rubber so treated yielded nearly 3 per cent. of isoprene. A sample of sheet rubber gave no isoprene, but products resembling dimethylbutadiene. — *Chem. Weekblad.*, 1926, p. 209.

* * *

A New Artificial Fibre.

According to the Berlin correspondent of *The Manchester Guardian*, Professor Herzog and Dr. Kunicke, of the Kaiser Wilhelm Institute, have produced a new fibre from the chitinous "shells" of crayfish, crabs, &c. The fibre is said to resemble silk in appearance, but to be slightly stronger.—(*Journ. Soc. Chem. Indus.*, 2nd July, 1926, p. 455.)

OBITUARY.

DR. A. W. CROSSLEY, F.R.S.

IT is with deep regret that we have to record the death of Dr. A. W. Crossley. He was born in 1869 and was educated at Owens College, Manchester, and at Wurzburg and Berlin. He was appointed Professor of Chemistry to the Pharmaceutical Society in 1904, and subsequently Daniell Professor of Chemistry at King's College, London. For his valuable services in connection with Chemical Warfare he was made C.M.G., C.B.E., and an officer of the Legion of Honour. After the war he became Director of Research to the British Cotton Industry Research Association and organised the Shirley Institute in Manchester. The reputation of this Institute is due in very large measure to his ability both as research worker and administrator. He had been suffering from ill-health for some time and his resignation as Director was announced only a few days before his death.

CONTRIBUTIONS.

THE EDITOR is prepared to consider signed articles for publication in *Tropical Agriculture*. Such articles should normally vary between 1,000 to 6,000 words and may be illustrated if desired. Rates can be obtained on application to the Editor.

REVIEWS.

THE COTTON GROWING COUNTRIES PRESENT AND POTENTIAL. London, P. S. KING AND SON, 1926. 12s. 6d.

The scope of this work cannot be better indicated than by quoting the opening sentences of its introduction.

"The International Institute of Agriculture published, in 1922, a monograph entitled "The Cotton Growing Countries," dealing with statistics and other details collected from sixty-eight countries. This was chiefly accomplished by means of the replies of their Governments to a questionnaire issued by the Institute . . . It almost immediately became an obvious necessity to continue the collection of information with the view of issuing another volume on a subject which had become more interesting than ever. Owing to the cordial support afforded by the Governments, and particularly by the Directors of Agriculture, the requisite material has come to hand plentifully without recourse to another special cotton questionnaire from the Institute. Statistics have been furnished by every country that compiles cotton figures, and it has consequently been possible to amplify the data very considerably."

The result is a very useful work of reference. Seventy-nine countries and colonies are listed, and for each are given, so far as possible, data of area and districts under cotton, total annual production for the past ten years, periods of planting and picking, species of Gossypium grown, local pests, local manufacture and consumption imports and exports, marketing, and transport conditions. The authorities quoted are cited in every case. The last fifty pages of the book are devoted to statistical tables of production, trade, mill consumption, stocks and prices.

E. E. C.

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ANIMAL PARASITES AND HUMAN DISEASE, by Asa C. Chandler, M.S., PH.D. In charge of the Hookworm Research Laboratory School of Tropical Medicine, Calcutta, India. Third edition revised 1926. John Wiley & Sons Inc., New York. Chapman & Hall, Ltd., 11, Henrietta Street, Covent Gardens, London, W.C.2. Price 22s. 6d. net. 573 pages in text and index.

This is a soundly written and compact text book on the parasites of man and their vectors and should fill the need of a sizable treatise on medical Zoology for practitioners in the tropics and others interested in the subject. When, however, the author digresses on matters such as the sociological aspect of venereal disease prevention and quinine therapy, &c., his opinions are not above criticism. Parts of the book have evidently escaped the revising pencil, for instance *ædes calopus* is discussed in one part and *ædes ægypti* in another.

The author points out in the preface that he has laboured to avoid a "mere compilation"; this he has achieved and the book is certainly an individual work worthy of study.

E. A. S.

SETTLING IN SOUTH AFRICA by Admiral Sir William H. Henderson, K.B.E., Chas. Knight & Co., Ltd., London, S.E. 1.

This publication is the result of a tour made by Admiral Henderson through many of the principal agricultural districts in South Africa. During this time he collected much useful information from settlers and officials with regard to the costs and conditions of taking up land, with special reference to the 1820 Memorial, Settlers' Association and the part it plays in land settlement. On the whole it is very fair and accurate, and Admiral Henderson does not allow his optimism to disguise the necessity for concentration and hard work on the part of the settler, together with a fair amount of capital before success can be reasonably expected. Particularly excellent is his advice that no intending settler should consider taking up land before spending six months, preferably twelve months, on one of the 1820 Memorial farms and later taking the disinterested advice of the Association in all such matters as the purchase of land, stock and equipment. If this advice is taken it is certain that settlers will have every chance of success. In addition to giving the cost of this preliminary training period, several budgets are included which are intended to give an idea of the items of cost for the first few years, and the probable returns. These figures appear to be fair, for the most part, and useful as the basis for a rough estimation of costs, but it should be clearly understood that conditions vary so much from one part of the country to another that it is quite impossible to give a budget which would hold true for more than one locality.

It is confidently to be recommended to anyone interested in land settlement in South Africa.

C. H.

BOOKS RECEIVED.

We have to acknowledge the receipt of the following books:—

A Treatise on Viticulture. A. E. Fernald, pp. 696, Macmillan & Co., London, price 25s.

Visit to West Africa, 1926. W. A. G. Ormsby-Gore, pp. 188 with map. H.M.S.O., London.

The Pocket Guide to the British West Indies, British Guiana and British Honduras. A. E. Aspinall, pp. 494, 19 illustrations, 15 maps. Sifton Praed, London.

The Year Book of the Bermudas, the Bahamas, British Guiana, British Honduras and the British West Indies, 1926-27. The Canadian Gazette and the Associated Canadian Industries Inc., pp. 368, 240 illustrations, map, price 4s.

Flora of Jamaica, Vol. V, part 3. W. Fawcett & A. L. Rendall, pp. 452, 156 illustrations. The British Museum.

Steam. Babcock & Wilcox, pp. 216, illustrated.

Nelson's West Indian Readers. J. O. Cutteridge, Vols. 1, 2 and 3, illustrated. Thos. Nelson, London, price 4s.

Fertilizer Requirements for Tropical Plants and Soils. Dr. A. Jacob & V. Coyle, pp. 263, illustrated. The Potash Supply Co., London.

Index Animalum, parts 10 and 11. C. D. Sherborn, pp. 630. The British Museum, price £1.

COLLEGE NEWS.

Mr. Edward T. Dixon who is a member of the Legislative Council, Jamaica, visited the College on the 5th April.

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Mr. and Miss Moody Stuart visited the College on the 18th March and were later shown round the Sugar Factory.

* * *

Mr. Aucher Warner, K.C., late Attorney-General of Trinidad, who was on a visit to the Island, paid a visit to the College on the 7th April, accompanied by Mrs. Warner.

* * *

Amongst other visitors to the College during the past month were: Mr. B. S. Perkins, Mr. and Mrs. A. M. Webb, Miss C. Wharton, Mr. C. A. Hicks, Trinidad; Mr. G. Sworder, Tobago; Messrs. W. V. Stevenson and H. P. Sheldon, London.

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Professor C. Y. Shephard and a party of three students left for Tobago on the 11th April to study the general economic conditions of the Island.

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Dr. Briton-Jones, Professor of Mycology, recently paid a short visit to St. Lucia for the purpose of making an investigation of the withertip disease of limes.

* * *

Mr. Geoffrey Evans, Acting Principal of the College, together with Mrs. Evans, accompanied Professor Ballou, Commissioner of Agriculture, on his tour to the Northern Islands.

* * *

At the last meeting of the Trinidad Science Club, Mr. J. E. Symond, Superintendent of the Sisal Plantation, Accra, Gold Coast, who is now taking a special course at the College, gave an address on "Sisal Hemp." At the next meeting on 26th May, Professor Dash will give a lecture on "Canadian Agriculture." The lecture will be illustrated by lantern slides.

* * *

Colonel H. C. Cockshutt, the late Governor of Ontario with Mrs. Cockshutt and their two daughters visited the College on the 16th March. They were shown round the College by the Acting Principal and evinced much interest in the Sugar Factory which was operating at the time of their visit.

* * *

His Excellency the Governor of Trinidad and Tobago accompanied by Lady Byatt and Miss Byatt, visited the College on 24th March, and after lunching with the Acting Principal, inspected the Experimental Sugar Factory. The working of the Factory and the various processes of sugar making together with the experimental work in progress, were explained in detail by Mr. W. Scott the Professor of Sugar Technology.

The announcement that the King has been graciously pleased to consent to become Patron of the Imperial College of Tropical Agriculture, has been received with much satisfaction by all who are connected with this institution. It should also serve to stimulate interest in the great Imperial movement that it represents. Moreover the action of His Majesty may be regarded as a further mark of recognition of the importance of the work in the direction of education and research that has been undertaken. The King is familiar with the site of the College for he visited it in 1880 on his memorable tour in H.M.S. *Bacchante* with his brother Prince Albert Victor. In their account of the cruise that was subsequently published the young Princes after describing a visit to the Maracas Fall wrote, "On returning the views appeared finer than they did on going up; one outlook over the plain was very like that over the sea in the distance; at another spot just above San Josef from the front of the church with the Yews on the right, the plain looked, in the low evening sunlight, just like an English park with its grass and large rounded trees standing here and there in the paddock."

That is still a remarkably accurate description of the historic pasture of St. Augustine on which the buildings of the Imperial College of Tropical Agriculture now stand.

* * *

SPORTS.

Cricket Club.

March	6th..	Imperial College XI	80 runs.
		Constabulary	..165 runs (home)
	13th..	Imperial College XI	161 runs for 1 wicket.
		Mr. W. Bushe's XI	84 runs (home). Birkett 107 Bain 54 not out.
	20th..	Imperial College	..184 runs for 1 wicket.
		Constabulary	..171 runs (home) Birkett 139 not out, Bain 33.

Record first wicket stand for College.

Hockey Club.

League.

March	15th..	Imperial College	.. 1 (Oates).
		Constabulary	.. 7 (away).

Geddes Grant Cup.

	22nd...	Imperial College	..4 (Heath 2, Rutter 1, Potter 1).
		Constabulary	..3 (away).
April	1st...	Imperial College	..1 (Croucher).
		Wanderers	..4 (away). (Cup final).

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—In the second week of March the position of the market underwent a change for the worse and became unsettled, values moved to a new low ground. No fresh development took place to influence the market one way or the other and the renewed decline could only be attributed to the unstable conditions prevailing on the speculative markets where heavy liquidation, followed by fair sales against actual sugar, took place. When news was circulated that five Cuban mills had finished grinding there was a partial restoration of confidence and quotations improved. Crystallised West Indian has been in poor demand, some of the Grocers having bought "to arrive" last year; quotations stand at low to fine yellow, 27*s*. 6*d*. to 32*s*. 6*d*. per cwt. duty paid. Muscovado Barbados have been dealt in at 19*s*. 9*d*. *c.i.f.* Quotations on 11th April were: Foreign 96° 14*s*.; Preferential 17*s*. 6*d*.

COTTON.—During March, prices showed a fair amount of fluctuation but there was little development of trade. The final ginning figures stand at 17,688,000 bales; 707,000 bales below the Bureau estimate. For several reasons a large consumption of American cotton is likely this season. India alone will take 500,000 bales, both Japan and China are substituting American for Indian on a large scale, and the same is true to a lesser degree on the Continent and in Lancashire. American low grades easily compete with Indian rival qualities.

CACAO.—The market continues good although the full advances have not been maintained. Accra touched 75*s*. 6*d*. *f.o.b.* for April-June shipment, but closed about 72*s*. and parcels afloat have been secured at 68*s*. *f.o.b.* On the spot, sales of Trinidad have been made at 85*s*. to 92*s*. according to quality; Grenada up to 90*s*. for fine, but later at 88*s*.; Common Dominica at 80*s*. per cwt. For the week ending 23rd March Plantation Trinidad closed at 82*s*. to 85*s*. *c.i.f.* according to mark; Superior Bahia 80*s*. and Summer Arriba at 95*s*. *c.i.f.* Quotations on 11th April for Trinidad L.L.T. were 86*s*. to 90*s*. and Grenada L.L.T. 84*s*. to 85*s*. per cwt.

COFFEE.—Strong demands have been experienced for Fine London Cleaned Costa Rica for export purposes which at 200*s*. has challenged the famous Jamaican Blue Mountain. Kenya and East Africa in general are selling excellent coffee. Bold and coloury Tanganyika has made 153*s*. and medium 133*s*. each per cwt. Uganda sends serviceable robust coffee at 98*s*. to 108*s*. Stocks of coffee being low the market tone is strong, but the re-export trade remains far below what it should normally be.

TEA.—Average prices made for tea during the week ended 26th March were 21.49*d*. Ceylon; 17.81*d*. Indian; 11.09*d*. Java; 17.53*d*. Assam; 22.16*d*. Darjeeling; and 20.19*d*. Sumatra. Southern India shows a steady growing business. England is buying 85 per cent. of Indian exports.

RUBBER.—Although prices were a little higher in the middle of March, the market had no marked features. American demand was fair and New York sending further orders. By 24th March prices were ½*d*. lower and although no material fall in values is looked for, it is difficult to see a sustained upward movement of any importance until supplies commence to diminish. For the week ending 19th March the position at the Port of London was as follows: imported 2,329 tons; delivered 2,545 tons; stock 61,300 tons.

The Board of Trade Returns for February indicate a better European demand. Shipments from the United Kingdom for the first two months of this year to Germany were 1,596 tons against 619 tons last year, to Russia 1,710 tons against 974 tons and to France 1,693 tons against 1,580 tons. Home Trade deliveries work out at about 8,000 tons for the two months compared with 5,300 tons last year. The figures published by the United States Department of Commerce show Imports for 1926 to have been 413,196 tons with Exports 17,695 tons, leaving net Imports 395,501 tons. On 24th March, business was done in First Crêpe at 1*s*. 8⅛*d*. and in Ribbed Smoked Sheet at 1*s*. 8⅜*d*. to 1*s*. 8¾*d*.

COPRA.—The market generally has been dull. During March sales of Jamaica were reported at £27 *c.i.f.* Rotterdam, and this figure represents the extreme value of Trinidad. Kiln dried copra from the East Indies makes £25 10*s*. per ton. A quotation for Trinidad *c.i.f.* 11th April stands at £26.

SPICES:—*Ginger*.—Some business is reported in new crop African (Spot 30*s*. per cwt.), Washed rough Cochin and Japan are unchanged but Jamaican is quoted rather lower.—*Zanzibar cloves and cassia* have been quiet and *cinnamon* has been neglected. East and West Indian (Unassorted sound brown F.A.Q. 1*s*. 1*d*. per lb., 11th April). *Nutmegs*—are firm but the smaller descriptions have been quiet.

OILS.—(*Palm and Palm Kernel*)—The market for palm kernel oil at Hull is quite fair, £38 is the price per ton. In London refined deodorized oil at £47 has a sale. Palm kernel acid oil is worth 35*s*. per cwt., ordinary and 36*s*. extra quality.

PALM KERNELS.—The Liverpool price is £19 7*s*. 6*d*., the London trade is slow but not discouraged and is as high for summer as for spot supply.